

**CLAIMS:**

1. A communication controller for communication on at least one communication bus, each communication bus transferring a data stream according to a communication protocol, the communication controller comprising a communication handler coupled to the at least one communication bus adapted to be programmable to perform transformations of the data stream.
2. The communication controller of claim 1, wherein the communication handler comprises a programmable decoder and/or encoder.
3. The communication controller of claim 1, wherein the communication handler comprises at least one programmable bit engine.
4. The communication controller of claim 1, wherein the communication handler comprises a programmable bit receiver and/or a programmable bit transmitter.
5. The communication controller of claim 1, wherein the communication handler comprises a programmable pattern detector.
6. The communication controller of claim 1, wherein the communication handler is adapted to be programmable to perform transformations of the data stream on bit-level.
7. The communication controller of claim 1, comprising a communication control unit for controlling the communication handler.
8. The communication controller of claim 1, comprising a memory for storing instructions to perform transformations of the data stream according to several communication protocols.

9. The communication controller of claim 1, comprising a debug unit.

10. The communication controller of claim 1, comprising a peripheral channel connection for rapid loading of instructions to perform transformations of the data stream according to custom protocols.

11. A microcontroller unit comprising the communication controller of claim 1.

12. The microcontroller unit of claim 11, adapted to communicate on several communication buses simultaneously, each communication bus transferring a data stream according to a respective communication protocol.

13. A method of using a communication controller for communication on at least one communication bus, each communication bus transferring a data stream according to a communication protocol, the communication controller comprising a communication handler coupled to the at least one communication bus adapted to be programmable to perform transformations of the data stream, the method comprising the steps of

- a. selecting a communication protocol;
- b. programming the communication handler with instructions to perform transformations of the data stream according to the selected communication protocol;
- c. receiving electrical signals representing data of the data stream;
- d. transforming the electrical signals representing data of the stream by the communication handler according to the programmed instructions.

14. The method of claim 13, further comprising the step of re-programming the communication handler with

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instructions to enable it to perform transformations of the data stream according to a re-selected communication protocol which is different from the previously selected communication protocol.

5 15.The method of claim 13, further comprising the step of generating an electrical signal representing logical bits from a voltage signal having transitions between voltage levels received on the communication bus and/or sending a voltage signal having transitions between voltage levels on the communication bus generated from an electrical signal representing logical bits, according to the communication protocol.

16.The method of claim 13, further comprising the step of decoding/encoding data of the data stream.

15 17.The method of claim 13, further comprising the step of detecting a predefined pattern in the data of the data stream.

18.The method of claim 13, further comprising the step of identifying and providing as parallel data a data field of logical bits received serially on the communication bus and/or providing for sending serially on the communication bus groups of logical bits provided as parallel data.

19.The method of claim 18, further comprising the step of identifying and providing a data frame representing a message from data fields of logical bits and/or identifying and providing fields of logical bits from a data frame representing a message.

20.The method of claim 13, carried out by a communication controller within a microcontroller.